



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/830,163	04/21/2004	Maria Tomas Martinez	GEPL.P-088	8109
43247	7590	12/13/2004	EXAMINER	
OPPEDAHL & LARSON LLP PO BOX 5068 DILLON, CO 80435			BOYKIN, TERRESSA M	
			ART UNIT	PAPER NUMBER
			1711	
DATE MAILED: 12/13/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/830,163

Applicant(s)

MARTINEZ ET AL.

Examiner

Terressa M. Boykin

Art Unit

1711

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-61 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-61 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 9-04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**Claim Rejections - 35 USC § 102**

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claims 1-4, 6-28, 30-61 are rejected under 35 U.S.C. 102(e) as being anticipated by USPub 20030232957 see abstract pages 1-10, figure 1, tables 1-5, 7-13, 14 and claims 1-50.**

In claims 1, 6, 10, 11, 13, 25, 30, 50, 51, 52, 54, 55, 61 **USPub 20030232957** relates to an extrusion method preparing polycarbonates from a solution of an oligomeric polycarbonate. A mixture of bis(methyl salicyl) carbonate (BMSC), BPA and a transesterification catalyst are first equilibrated at moderate temperatures to provide a solution of polycarbonate oligomer in methyl salicylate. The solution is then fed to a devolatilizing extruder, where the polymerization reaction is completed and the methyl salicylate solvent is removed. The solution comprising the oligomeric polycarbonate can also be pre-heated under pressure to a temperature above the boiling point of methyl salicylate and subsequently fed to a devolatilizing extruder equipped for rapid flashing off the solvent. The method provides polycarbonate with greater efficiency than the corresponding process in which unreacted monomers are fed to the extruder.

Additionally, the method of the invention does not require the isolation of a precursor polycarbonate comprising ester-substituted phenoxy terminal groups.

The reference, more specifically to applicants' claims, relates to a method for preparing solutions comprising an ester substituted phenol solvent and an oligomeric polycarbonate, and the conversion of said oligomeric polycarbonate into high molecular weight polycarbonate with simultaneous removal said solvent, said method comprising: Step (I) heating a mixture comprising at least one dihydroxy aromatic compound, an ester substituted diaryl carbonate and a transesterification catalyst at a temperature in a range between about 100 C. and about 300 C. to provide a solution of an oligomeric polycarbonate in an ester substituted phenol solvent; and step (II) extruding said solution of oligomeric polycarbonate in said ester substituted phenol at one or more temperatures in a range between about 100 C. and about 400 C., and at one or more screw speeds in a range between about 50 and about 1200 rpm, said extruding being carried out on an extruder comprising at least one vent adapted for solvent removal.

Specifically, the reactants are combined in a vessel in a ratio between about 0.95 and 1.3 moles, preferably between about 1.0 and about 1.05 moles of ester substituted diaryl carbonate per mole of dihydroxy aromatic compound. The amount of transesterification catalyst employed is between about  $1.0 \times 10^{-8}$  and about  $1 \times 10^{-3}$ , preferably between about  $1.0 \times 10^{-6}$  and about  $2.5 \times 10^{-4}$  moles of transesterification catalyst per mole of dihydroxy aromatic compound employed. Upon heating the mixture at one or more temperatures in a range from about 100. C. to about 400. C., preferably

from about 100. C. to about 300. C., and still more preferably from about 100 C. to about 250. C., reaction occurs to produce a solution comprising an equilibrium mixture of product oligomeric polycarbonate, by-product ester substituted phenol (solvent), transesterification catalyst, and low levels of the starting materials, dihydroxy aromatic compound and ester substituted diaryl carbonate. This is referred to as "equilibrating" the reactants. Typically the equilibrium strongly favors the formation of product oligomeric polycarbonate and by-product ester substituted phenol and only traces of the starting materials are observed. The "equilibrated" product mixture may then be introduced into a devolatilizing extruder to effect removal of the by-product ester substituted phenol solvent while converting the oligomeric polycarbonate into a higher molecular weight product polycarbonate.

With regard to claims 2, 3, 4, 26, 27, 28 the reference states that data for Examples 95-97 are gathered in Table 14 and are consistent with the formation of copolycarbonates comprising both BP and BPA residues. The product copolycarbonate samples were clear and had no visible yellowness. Note tables 1 and 2 and examples 1-5 with regard to residence times. The reaction mixture was stirred and heated until equilibrium was reached. Equilibrium was reached in about 80 minutes at about 165 C. and in about 10 minutes at about 220 C.

With regard to claims 7, 8, 9, 12, 31, 32, 33, 36 note that the reference states that the oligomeric polycarbonate comprises repeat units derived from at least one dihydroxy aromatic compound. Dihydroxy aromatic compounds are illustrated by dihydroxy benzenes, for example hydroquinone (HQ), 2-methylhydroquinone, resorcinol, 5-

methylnresorcinol and the like; dihydroxy naphthalenes, for example 1,4-dihydroxynathalene, 2,6-dihydroxynaphthalene, and the like; and bisphenols, for example bisphenol A and 4,4'-sulfonyldiphenol. The oligomeric polycarbonate typically contains polycarbonate repeat units derived from at least one bisphenol which would imply that one or more may be used.

With regard to claims 20, 21, 44, 45, note that the reference states In Examples 6-11 (Table 2) the ratio of BMSC to BPA employed in the equilibration reaction was 1.017. At equilibrium, the solution of oligomeric polycarbonate prepared from mixtures of BMSC (1.03 moles BMSC per mole BPA), BPA and TBPA ( $2.5 \times 10^{-4}$  moles per mole BPA) was about 45 percent by weight polycarbonate oligomer and about 54 to about 55 percent by weight methyl salicylate.

With regard to claims 14, 15, 38, 39, 56, 57 note that the reference is concerned about the degradation of diaryl carbonate and seeks to remove impurities which may contribute thereto. For example the reference states:

"Lastly, the tendency of polycarbonates to degrade at high temperature, for example during molding, with concomitant loss of molecular weight and discoloration correlates strongly with the presence of contaminating species within the polycarbonate. In general, the level of purity of a product polycarbonate prepared using a melt reaction method such as the instant invention will closely mirror the level of purity of the starting monomers."

With regard to claims 35, 37, 30 note that the reference states Solutions of oligomeric polycarbonate in methyl salicylate were prepared by equilibrating a mixture of bis(methyl salicyl) carbonate (BMSC), bisphenol A (BPA) and transesterification catalyst, tetrabutylphosphonium acetate (TBPA), at a temperature in a range between about 160.degree. C. and about 220.degree. C. in a batch melt reactor *under a*

*nitrogen atmosphere* which would necessarily exclude the presence of substantial oxygen in the atmosphere.

With regard to claims 16, and 40 note that the reference discloses in one embodiment of the invention reactants, ester substituted diaryl carbonate, dihydroxy aromatic compound and a transesterification catalyst are combined in a reaction vessel 10 and heated at a temperature in a range between about 100.degree. C. and about 300 C., preferably between about 150 C. and about 250 C., at a pressure between about 1 atmosphere and about 10 atmospheres, preferably between about 1 and about 2 atmospheres, to provide a solution of an oligomeric polycarbonate in an ester substituted phenol.

With regard to claims 17, 19, 41, 43 note that the reference discloses that the recovered ester substituted phenol may be purified by distillation or other means and recycled to prepare additional ester substituted diaryl carbonate.

With regard to claims 18, 42 note Tables 7-13 in the reference.

With regard to claims 22, 23, 24, 47, 48 and 49 note Table 1.

With regard to claim 46 note that the reference states that the solid is filtered off and the resulting filtrate is analyzed by high performance liquid chromatography (HPLC) using p-terphenyl as the internal standard.

With regard to claims 58 though 60 note figure 1:

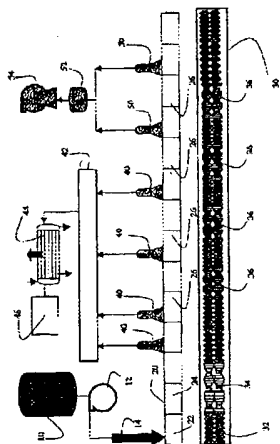


FIG. 1 illustrates a devolatilizing extruder and feed system suitable for use according to the method of the reference.

The method may be carried out in a batch or continuous mode. In one embodiment, the method of the present invention is carried out as a batch process wherein monomers and transesterification catalyst are equilibrated in a batch reactor to form a solution of the oligomeric polycarbonate. This solution is then fed to a devolatilizing extruder and the product polycarbonate is isolated until the solution is consumed. Alternatively, the method of the present invention may be carried out as a continuous process wherein the monomers and catalyst are continuously fed to, and the solution of oligomeric polycarbonate is continuously removed from a continuous reactor. Thus a mixture of BMSC, BPA and transesterification catalyst may be fed to one end of a tube reactor heated to a temperature between about 160 C. and about 250. C. A solution of an oligomeric polycarbonate comprising phenoxy end groups II emerges at the opposite end of the tube reactor and is fed to a devolatilizing extruder from which emerges the product polycarbonate.



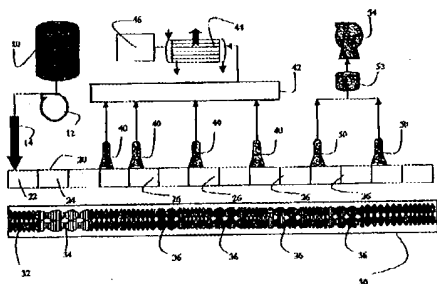


FIG. 1 illustrates a devolatilizing extruder and feed system suitable for use according to the method of the reference.

The method may be carried out in a batch or continuous mode. In one embodiment, the method of the present invention is carried out as a batch process wherein monomers and transesterification catalyst are equilibrated in a batch reactor to form a solution of the oligomeric polycarbonate. This solution is then fed to a devolatilizing extruder and the product polycarbonate is isolated until the solution is consumed. Alternatively, the method of the present invention may be carried out as a continuous process wherein the monomers and catalyst are continuously fed to, and the solution of oligomeric polycarbonate is continuously removed from a continuous reactor. Thus a mixture of BMSC, BPA and transesterification catalyst may be fed to one end of a tube reactor heated to a temperature between about 160 C. and about 250. C. A solution of an oligomeric polycarbonate comprising phenoxy end groups II emerges at the opposite end of the tube reactor and is fed to a devolatilizing extruder from which emerges the product polycarbonate.

Thus, the reference discloses a method of preparing a polycarbonate oligomer mixture prepared from the same components as claimed by applicants. Thus in view of the above, there appears to be no significant difference between the reference and that which is claimed by applicant(s). Any differences not specifically mentioned appear to be conventional. Consequently, the claimed invention cannot be deemed as novel and accordingly is unpatentable.

### **35 USC 103**

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 5, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPub 20030232957 in view of USP 6399738.**

With regard to claims 5, 29 the reference **USPub 20030232957** discloses a process prepared from the same components as claimed by applicants except for the particular thin film melt process as claimed. However, USP 6399738 discloses thin film melt-phase for polymerizing the oligocarbonate having been prepared in the previous step to produce a polycarbonate having an increased molecular weight, and it comprises putting the oligocarbonate into a polymerization reactor equipped with heating, pressure-reducing and melt film-forming units, melting and forming it into a thin film by

driving the pressure-reducing unit, and increasing its molecular weight to produce the intended polycarbonate having an increased molecular weight. This method is referred to as a thin-film polymerization method. In the method, the transesterification of the oligocarbonate is much promoted to give the intended polycarbonate having an increased molecular weight. In this, therefore, the oligocarbonate in melt forms a thin melt film having a thickness of at most 5 mm, preferably at most 3 mm, more preferably at most 1 mm in the presence of a catalyst such as the above-mentioned quaternary phosphonium salt or the like, and undergoes transesterification at a reaction temperature falling between 50 and 320 C., preferably between 100 and 320 C., more preferably between 150 and 280.degree. C., under a reaction pressure falling between 0.1 Torr and 5 kg/cm.<sup>sup.2</sup> G, for a reaction period of time falling between 1 minute and 100 hours, preferably between 2 and 20 hours. Forming the thin melt film of the oligocarbonate is not specifically defined. For example, the oligocarbonate is dissolved in a solvent such as that mentioned hereinabove in the section of (4) solvent step of preparing oligocarbonates, then the resulting solution is spread over the bottom of a reactor having a broad bottom area, and the solvent is evaporated away under heat to give a thin melt film of the oligocarbonate. The solvent is preferably a halogenohydrocarbon.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the thin film melt process as claimed since such is disclosed in the art as a common process employed therein.

Consequently, the claimed invention cannot be deemed as unobviousness and accordingly is unpatentable.

### **Correspondence**

Please note that the cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site ([www.uspto.gov](http://www.uspto.gov)), from the Office of Public Records and from commercial sources. Applicants may be referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Terressa Boykin whose telephone number is 571 272-1069. The examiner can normally be reached on Monday through Friday from 6:30am to 3:00pm.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. The general information number for listings of personnel is ( 571-272-1700).

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

Art Unit: 1711

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

tmb

A handwritten signature in black ink, reading "Terressa Boykin". The signature is written in a cursive style with a large initial 'T'.

**Examiner Terressa Boykin**  
**Primary Examiner**  
**Art Unit 1711**